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ABSTRACT

Provision of information for research and development in science and technology in Ethiopia was studied by 50 participants in a seminar on evaluation and analysis of a national information policy and plan. Policy makers and planners, users, producers and suppliers of information, information specialists, and representatives of Unesco (United Nations Educational, Scientific and Cultural Organization) and SAREC (Swedish Agency for Research Cooperation with Developing Countries), worked together to: assess the size and structure of the user community for scientific and technical literature on the postsecondary education and research and development level; review the present system for information provision in science and technology at this level; and propose measures for improvement of this information provision. Following a general discussion of these objectives and an examination of the Addis Ababa University system of information provision, a number of suggestions are presented which include: organizational rationalizations; the potential use of microcomputers for certain operations; facilities and agreements for more effective sharing of locally available resources; development of a National Science and Technology Information and Documentation Center at ESTC (Ethiopian Science and Technology Commission); a bilateral cooperation program for computerized information retrieval and back-up of photocopies for documents not locally available; and a component of literature provision for undergraduate studies in science and technology. (THC)

Stockholm Papers in Library and Information Science

Schwarz & Winkel: Background Study and Proposals

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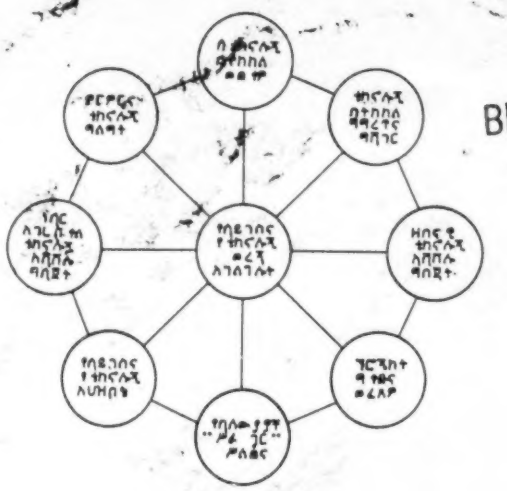

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Stephan Schwarz and Annette Winkel

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Background study and proposals for development of information provision in Science and Technology in Ethiopia.

(Report from a mission to Ethiopia, 2-14 April 1984)

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Summary

Information provision for research and development in Science and Technology in Ethiopia was studied by a SAREC mission aiming at a project proposal. A brief report is given on objectives, presentations and proposals from a seminar on "National Information Policy and Plan" organized by the Ethiopian Science and Technology Commission and UNESCO. Discussions with officials were held at ESTC, the University libraries and institutions involved in pure and applied research to investigate the working conditions and needs for information supply. A number of suggestions are presented including some organizational rationalizations, the use of microcomputers for certain operations, facilities and agreements for more effective sharing of locally available resources, development of a National Science and Technology Information and Documentation Center at ESTC, a bilateral co-operation program for computerized information retrieval and back-up of photocopies for documents not locally available, and a component of literature provision for undergraduate studies in Science and Technology.

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I. OBJECTIVES OF THE MISSION

a) To participate as "resource persons" in the "Evaluation and analysis seminar on national information policy and plan", organized by ESTC in Nazreth, Ethiopia, 4-7 April 1984, in co-operation with PGI, UNESCO.

b) To assess the size and structure of the user community for scientific and technical literature on the post-secondary education and R&D level.

c) To review the present system for information provision in Science and Technology on the post-secondary education and R&D level.

d) To propose measures for improvement of this information provision, inter alia considering strengthening of the operational role of a National S&T Information Service within ESTC, and a bilateral program for information retrieval and back-up of photocopies for documents not available in Ethiopia.

II. ESTC AND ITS MANDATE IN S&T INFORMATION PROVISION

The Ethiopian Science and Technology Commission (ESTC) was established by Proclamation No 62 of 5th December 1975, (ref 1) The Commission's functions include the formation of policies for development of all R&D system appropriate for the combined needs of skilled manpower and indigenous research. ESTC also co-ordinates research programs in the country and acts as a national counterpart for R&D programs (partly) funded by external sources like SAREC, IDRC and UNDP. To support these activities, ESTC has created the nucleus of an information and documentation centre, with the original assignment to serve the Commission and its various Research Councils and Working parties.

In a Unesco mission report, "Establishment of a National S&T information centre" (ref 2, 1978) it was recommended to develop the R&D nucleus at ESTC into a national documentation centre and a co-ordinating body for a national information system (network). This proposal was a grand design which has to be revised to adapt to the current size and conditions of the R&D system and its existing I&D-support. The proposals of the present report offer a pragmatic approach to imminent problems of S&T information provision both on the undergraduate level and on the post-graduate and R&D levels in line with the above stated objectives of the mission.

III. SEMINAR ON THE NEED FOR AN ETHIOPIAN NATIONAL INFORMATION POLICY AND PLAN

Summary and conclusions

The seminars were planned and organized by the Ethiopian Science and Technology Commission (ESTC) in close collaboration with UNESCO (ref 3).

1. Goals and objectives of the seminars were as follows:

   - to analyze current activities within the information field in Ethiopia and evaluate the present situation in view of expected needs and future developments.

   - to propose appropriate measures to promote coordination among the existing and future information services both within the country and in respect to regional and international cooperation.

   - to set out where international assistance is needed.

   - to recommend the elaboration of a National Information Policy and Plan within the framework of the development plan.

2. The number of participants were about 50 belonging to the following categories:

   a) policy makers and planners, b) users, c) producers and suppliers of information, d) information specialists, e) UNESCO, UN University and SAREC representatives.

3. The main topics of the seminar were:

   - a historical review of the information work in Ethiopia (ref 5)

   - information for agricultural development in Ethiopia

   - national information policy (ref 4)

   - manpower education and training in library and information science (ref 6)

   - technological aspects of information handling, covering items such as: impact of new technology, the need for a microprocessor laboratory (ref 7) and Amharic character generation (ref 8)

   - international assistance, including back-up services for scientific and technological literature.

4. On the last day of the seminar the participants were organized into working groups aiming to identify problems concerning the present I&D situation and to propose solutions. These were compiled and reformulated as recommendations addressed to the sponsors of the seminar.

It was recommended that

a) a Permanent National Information Coordinating Council should be established and be responsible for
   1) the formulation of a National Information Policy,
   2) the planning of the implementation of ch policy,
   3) devising a long-term computing policy, id
   4) the promotion of regional and international cooperation.

b) the present training program for librarians and information specialists should be evaluated and restructured and that these groups should be given better working and social conditions.

c) a database of all research documents published and available in Ethiopia should be established and a project in this respect should be launched immediately.

d) a microcomputer laboratory should be set up within the AU Faculty of Technology.

e) access to international databases should be established on an operational basis.

f) international assistance should be solicited for the purpose of 1) the I&D services of the ESTC, 2) training of information specialists at all levels, 3) conduction of a pilot study on the provision of required information for research projects co-ordinated by ESTC, 4) promotion of cooperation within the field of S&T information provision with respect to all sources and users.

IV. THE USER COMMUNITY FOR S&T LITERATURE ON POST-SECONDARY EDUCATIONAL LEVEL

Literature dealing with S&T is produced for many different user groups with widely different background. The more advanced literature requires a more advanced background

of previous studies to be adequately selected, understood and applied. Only a very small group can effectively use the large output of R&D journal and monograph literature acquired by academic and other research libraries, whereas a larger group uses textbooks on university level, a still larger group uses textbooks on secondary education level and a still larger group (at least in principle) can use popularization and extension literature. The emphasis here is on university-level literature, viz. textbooks, monographs, handbooks and the vast literature presenting actual R&D projects (journals, conf. proceedings and "grey literature"-reports). In Ethiopia the user groups concerned are found in University department (undergraduates, post-graduated and research staff), Research institutes (like the Institute of Agricultural Research (IAR)), and other parastatal institutions (like ESTC, Ministeries of Education, Industries and Agriculture, and the Handicrafts and Small-Scale Industries Development Agency(HASIDA), some industries and some international organizations (like the International Livestock Centre for Africa (ILCA)).

University level education in Ethiopia dates back to the early 50's and a unified university organization was established in 1961. The Addis Ababa University (AAU) has campuses in different places in Ethiopia, but the Science and Technology faculties are placed in Addis Ababa. From 1974 there was a certain setback for higher education and the research and education situation was normalized only after several years.

The 1983 enrolment figures have approached 20.000 including extensional evening classes in Biology, Chemistry, Mathematics, Physics and Statistics. The Faculty of Science has 4-year BA programs and additional 2 year Masters programs. The faculty of Technology has 5 year BA programs in Building and Architecture, Civil, Electrical and Mechanical Engineering but presently no Masters programs. In the faculty of Technology the number of full-time students (in 1981-82) was 580 and

extension students 970. The largest Master program is in Chemistry, where 4 students are recruited annually and about 25 have graduated so far. A Ph.D. program (2 students) has just started in Chemistry. Including the R&D work performed by university staff, an estimate of 40-50 ongoing projects seems reasonable. Consistently with this estimate a list of publications for the years 1980-82 (ref 12) lists about 70 reports (journal articles and unpublished MSc-theses). It must be noted that faculty members have a heavy burden of teaching and of producing textbooks for the undergraduate level. (For curricula and programs see refs 9-10).

It was not possible for the consultants to estimate the need of university-level literature outside the University. The number of external users is not indicative, due to present admission policies of the AAU library system. A research organization like IAR has a large staff of graduates, but in applied research related to Science & Technology the effort seems to be limited outside the University. The extension service program, now within the ministry of Education (with a stationary Unesco-expert) is to be considered, as well as HASIDA although at present these do not seem to be major users of the University library. International organizations operating research programs in Ethiopia, seem to relate to the agricultural and medical field rather than to Science and Technology. ESTC in fulfilling its policy-making and co-ordinating functions is a (potential) user of the University library system. Externly funded research (e.g. SAREC, UNDP) which is administered by ESTC is to a large extent placed into University departments.

V. THE ADDIS ABABA UNIVERSITY LIBRARY SYSTEM AND OTHER SOURCES OF INFORMATION PROVISION

V. 1 Organization

During the last decade many new research libraries have been established and by now about 50 units are functioning (ref 5). However, since several of them belong to various ministries and parastatal organizations, coordination for

effective resource sharing is difficult. The dominant resource is the AAU library system. It comprises the central (Kennedy) library located in the main campus and twelve specialized branch libraries in and outside the AA area (ref 9). Statistics for the academic year 79/80, limited to the six libraries situated in AA were available (ref 13). By now the total holdings could be estimated to more than 0.5 M volumes and the growth rate is about 20.000 vol/year (where each journal issue counts).

The AAU libraries have about 240 employees but only 11 are professionals in the sense of holding a BA or MA in library science (or equivalent). About 25 persons have an LS undergraduate diploma. The chief reason for this situation is the lack of educational opportunities in LS in Ethiopia. The department of LS was transferred to the University Library administration in 1978 and a revised curriculum was set up. Now about 30 students graduate annually with diploma. There has, however, been only one full-time instructor and a graduate assistant out of a total staff of four, and AAU library professional staff have been obliged to provide a major part of teaching.

V. 2 User Services

Total seating capacity exceeds 3.500, but far from all undergraduates (only ca 25%) can be accomodated at the same time. This is a serious problem since students normally do not have any alternative working place for study of textbooks, and since much of the available material can only be used "on the spot".

The library loan statistics (ref 13) clearly show the heavy demand for textbooks. Out of about 400.000 loans from the collections of the S&T libraries, 350.000 loans are so-called "reserve" loans, i.e. from a special reserve of textbooks issued only for one hour (cf section IV. 5) The two-week

loans by students are about 40.000, presumably to a large extent undergraduate texts as complementary reading for courses. Faculty staff loans are only about 4.600, i.e. just above 1% of all registered loans. It should, however, be noted that much of the research level material is consulted in the reading areas adjacent to the stacks open to faculty only, which obviously would modify the statistics recorded, but this does not change the overall picture of a major part of funds being spent on research level literature used only by a very small group active in R&D.

The facilities for copying of documents are insufficient for the heavy demand (both for undergraduate course handouts and for research projects). This has the side effect of losses in terms of mutilation and disappearance of journals and books.

Users not belonging to the university need certificates from their institutions for access to the library collection and for loans. Such certificates, which are not institutional but personal, have limited validity in time, a bureaucratic barrier to admission which is said to be due to the staffing and space situation and gives rise to considerable complains.

In the area of S&T only about 0.02% (sic!) of the users served are external and less than 3% are faculty staff members, 6% are technical and administrative staff and finally the remaining 91% are students, practically all on undergraduate level. As a comparison, about 50% of the services provided by the Royal Institute of Technology Library in Stockholm are for industry and non-university organizations/ institutions and the figure is about 62% in the case of the National Library of Technology, Denmark.

I&D services such as indexing, abstracting, SDI- and on-line retrieval services, and computer processing of bibliographic data have not yet been exploited in general, but only by international organizations (like ILCA and Pan African

Documentation and Information System (PADIS)) and externally funded projects (like the cooperation between the Medical Faculty Library and KIBIC, Stockholm). The telecommunications network should be able to accomodate long distance computer connections (via satellite or other telephone channels) but there still seems to be some technical and administrative problems which have to be overcome.

V. 3 Library routines and technical services

Library routines such as cataloguing and classification, binding, microfilming and reprography are executed as centralized services from Kennedy Library. The Library of Congress (LC) system of classification and the AACR-II rules of cataloguing are applied. The catalogue medium is cards, and each branch library has a card file covering its own collection. Duplication of the catalogue entries, i.e. for authors/title file and subject file etc is made by retyping of cards. There is only one union catalogue available, viz. in the main (Kennedy) library.

The capacity of the binding workshop is insufficient, at least partly due to the technique and administrative routines. As a result, the most recent volume (or even several volumes) are unavailable (or at least available with great difficulty) for up to a year or more. This causes undue barriers to official use of important material.

Repography is always a problem due to a combination of lack of funds for equipment and difficulties of maintenance. This certainly contributes to an underuse of existing library resources.

Offset printing is also scarce, due to lack of equipment and high quality paper. A major part of compendium produced within the University's textbook programme is stenciled, which at least if produced from manually typed stencils is a time-comsuming technique with particular problems in reproducing figures (half-tone pictures are not possible).

V. 4 Collections and acquisitions

The AAU libraries' budget appropriated for books and periodicals was in 1983 about 750.000 Birr (= 380.000 US$). About 50% go for the S&T libraries' acquisitions. In the annual report 1979/80 (ref 13) it is stated that the books/serials percentage is 50/50 within S&T. In 1983 more than 60% of the total acquisition budget was spent on serials; within S&T probably a much higher percentage, since only 200 monographs were purchased to the Library of Technology in 1983. Nevertheless, the number of current journals in the same library has decreased from 249 to 112 since 1980 (ref 17). For the whole library system the number of periodicals titles has gone down in 4-5 years from about 3000 to the present number 1300 (ref 14). Quite a few important journals are received as gifts or on exchange, mainly using the Journal of Ethiopia Studies, Ethiopian Publications and Ethiopian Medical Journal as exchange materials (ref 15).

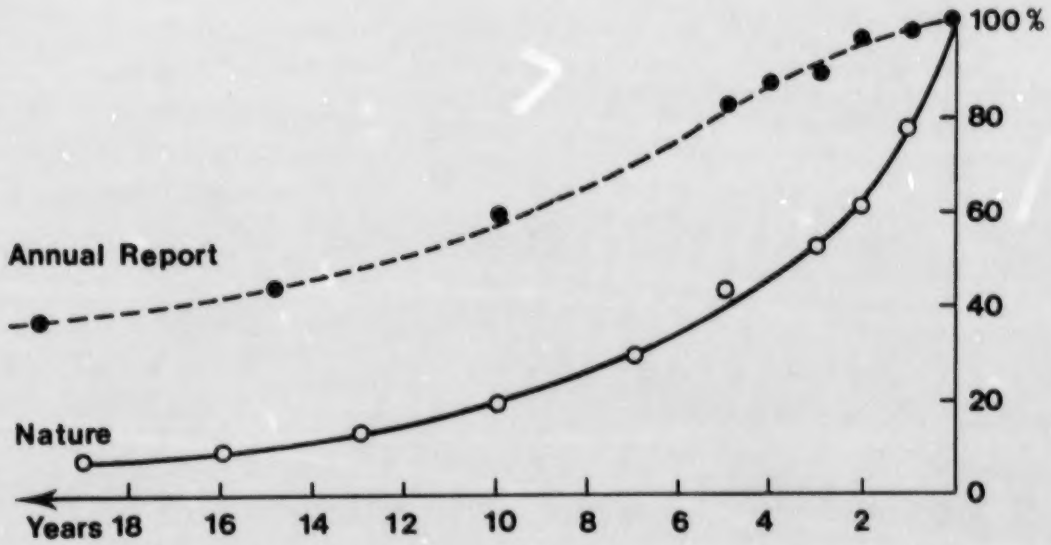
A survey of current titles for 1982 give the following picture for departments in S&T (ref 14).

Department	No of titles	
Biology	88	incl. Biological Abstracts; Current Contents (Life Sci.)
Chemistry	42	incl. Chemical Abstracts; Current Contents (Phys. Sci.)
Geology	51	incl. Bibliographical Index of Geology
Mathematics	29	incl. Mathematical Reviews
Physics	23	incl. Physics Abstracts
Statistics	10	
Civil Engineering	37	(of which many proc. of ASCE)
Electrical Engineering	43	(mostly IEEE publications)
Mechanical Engineering	22	incl. Current Technology Index Applied S&T Index Engineering Index Metals Abstracts

It should, however, be noted:

a) that since 1982 a number of periodicals have been discontinued
b) that in most cases the collections do not go very far back in time, and
c) that a large number of single items or full volumes are missing even from journals subscribed to, due to irregularities in allocation of convertible funds (e.g. in the period 1974-78) and to unreplaced losses. This situation adds to the need of comprehensive and fast external back-up services (see e.g. ref 18)

There is one further indicator for the need of effective support of I&D services to R&D projects. A survey of the age of all references given in the Annual Report III (1981) for the department of Chemistry (ref 2.p), when cumulated, gives the following picture:



Integrated distribution of reference age in the Annual Report (1981) from the department of Chemistry. The ordinate for a point on a curve gives the percentage of references older than the abscissa reading. An issue of Nature has been analysed for comparison. Note that the 50 % point in the Nature curve coincides with recent measurements of the use of serials at BLLD (ref 21).

The top curve gives the percentage of references older than the abscissa reading, while the dotted cure gives a curve corresponds to an issue of Nature. The difference shows in an obvious way the shift from recent references to older ones. A plausible interpretation is the relative difficulty of obtaining recent literature, i.e. that the local collection of journals is insufficient and effective back-up for material from other journals is not available. It should, though, be noted that some of the research areas concerned may not be fast-moving on the international scene so that the comparison with the "norm" of Nature should be taken with due prudence.

One type of highly relevant but not easily available literature is journals and other documents (grey literature) from 3rd World countries. Access to part of the bibliographic references to this literature (at least in agriculture and medicine) is possible through international IR-systems, like AGRIS, CAB, Medline, and information services like those of WHO, UNIDO and various international federations in specialized areas. Within the field of S&T this is generally not effective and contacts in terms of regular exchange between institutions or within "invisible colleges" do not function systematically for information transfer between 3rd World countries ("south-south dialogue"). A large number of proposals have been worked out, e.g. interesting UNESCO/PGI-projects, but so far, University libraries have not seen such programmes as a high-priority area for systematic build-up of special collections.

V. 5 The textbook problem

It was mentioned before that the majority of library users are undergraduate students. In S&T there are about 6000 students following a broad spectrum of general or specialized courses (see University Catalogue, refs 9-10.) The lack of textbooks is precarious and essentially three avenues are followed to cope with this problem, since in most cases students cannot afford to keep private copies of books:

a) Bookstore: The faculties used to designate special funds for textbooks, handled by a "faculty bookstore", i.e. not within the university library administration. Sets of books were purchased to be lent to students for the duration of a course. These allocations seem to have been discontinued already in 1978. The remaining books rapidly get outdated and heavily worn, and the numbers are insufficient for a growing student population.

b) Reserve collection for "spot reading". The Library System acquires textbooks for courses, the original ambition being at least one copy for 20 students (sometimes up to 60 students share one copy). These books are available only for use in the libraries and are checked out for 1 hour. This results in difficult working conditions and permanent queues for access and renewals. Only a small part of the acquisition budget is used for renewal of these collections.

c) The University textbook production programme, which was mentioned in the context of printing facilities (section V.3) Faculty members are encouraged to write their own texts for courses. Most manuscripts are in English. This procedure, which is not uncommon in the academic world, results in texts at a much lower cost than imported literature and with relatively small expenditure in forein currency. However, a considerable number of texts have been produced or are in progress (refs 11 and 12). This contributes significantly to relieving the problem of textbook provision on the undergraduate level. This problem still seems to be most urgently in need of effective handling with regard to its impact on development of qualified manpower and recruitment of research students.

V. 6 Interlibrary and international transactions

Interlibrary loans to other institutions are not very frequent within S&T, perhaps a little more than 100 a year. A higher percentage of loans from the AAU libraries to external institutions would improve the resource-sharing advantages

of the research-level literature but due to present service policies of AAU libraries, requests for loans agreements from organizations with no libraries of their own are now frequently turned down (ref 13).

The need for international loans of research literature to the users of the AAU libraries is obvious, but limited in practise because of the fairly high costs for loans or photocopies from BLLD. To take an example only about 50 items per year are received for the users of the branch library of Technology. Loans from BLLD could be provided within 2 or 3 weeks, but in many cases the users have to wait longer or the requests are not forwarded because of lack of funds. The possibility offered e.g. in Commonwealth countries to purchase BLLD coupons in local currency through the British Council does not seem to be available.

The Medical Library has established a collaboration with Karolinska Institutet in Stockholm since 1980. About 80 requests resultning from the print-outs of bibliographical records of about 12 SDI profiles are handled annually. The SDI profiles are updated currently in Sweden based on input from Ethiopia.

V. 7 International Livestock Centre for Africa (ILCA)

was established 1974 with its headquarters in Ethiopia and is (one of the 13 international agricultural research centres sponsored by the Consultative Group on International Agricultural Research CGIAR) is financed by the World Bank. The major task of ILCA is research in animal production, but the documentation centre has a program of wider scope for information supply to institutions in and outside Ethiopia in related areas.

The centre has its own computerized information storage and retrieval operation, using a Hewlett Packard 3000/III computer with MINISIS software. Relevant incoming documents are catalogued, indexed according to the FAO thesaurus and abstracted, and the bibliographic descriptions entered

in a data base. In addition SDI services on databases from the Commonwealth Agricultural Bureaux (CAB) and AGRIS are available not only to ILCA staff but also to researchers in and outside Ethiopia, and membership cards with no limitations on time can be obtained. About 60 search profiles are maintained for ILCA staff and a similar number for other users in Ethiopia out of a total number of 350 in Africa. Enquiries can be made by letter, telex or in person. The information requested is supplied free of charge in the form of computer printouts. Documents are delivered as microfiches or photocopies if they can be found in the ILCA library collections. The library subscribes to 350-400 journals and a large percentage of the requests can be satisfied. The document back-up within Ethiopia is poor and BLLD is frequently used for requests from ILCA project staff.

ILCA has own computer staff (4 persons). There are 25 terminals in the centre hooked up to the computer. In principle access by an external terminal could be possible, but there seem to be some problems with the local telecommunication system which must be solved.

Furthermore, the centre owns 3 HP-125 microcomputers, a computerized type setting machine, powerfull photo copy equipment and offset printers. In the near future a new HP 3000/48 will be installed. The annual budget for the I&D services is 350.000 US$ and further 450.000 are spent on the printing and publishing service.

V. 8 Computers

Over the year a number of computers have been installed in different organizations unfortunately in a somewhat hap-hazard manner due to special circumstances (ref 7). Examples are NCR-U-8455 and 8555 (inter alia in AA university administration), Burroughs B 3731, IBM system-10 and system-34, HP 3000/40, 44 and III, a dozen NCR-I-8250 and 9020 minis and so on. The only installations equipped with an IR-system useful for bibliographic searches are the HP-3000s at ECA and ILCA with MINISIS software.

VI. STRENGTHENING S&T INFORMATION PROVISION IN ETHIOPIA (Part 1)

Roles for a National S&T Information and Documentation Centre (ESTIC) within ESTC

VI. 1 Local activities coordinated by ESTIC to monitor needs and ressources.

VI. 1.1 Inventory of on-going R&D projects in Science and Technology

Research in University institutions is performed by staff or by postgraduate students supervised by staff. There are also a number of institutions and organizations dealing with projects of applied research and applications of technology. The total number of projects and personnel involved is at present, very limited. Projects can be described in a reasonably unified way by means of the UNESCO guidelines. An inventory can be brought up-to-date annually. Later, the file can be processed on a micro-computer for updating and various kinds of statistics and follow-up of research results and applications.

VI. 1.2 Inventory of personnel involved in R&D or with R&D experience

Advanced texts in S&T, i.e. most research journals and monographs, can normally be used effectively only by persons on a postgraduate level. The use by undergraduates is limited to literature search training and to selected readings to amplify the textbook literature. The user community of I&D services in S&T therefore is in the first instance limited to personnel involved in ongoing projects, in the second instance to persons with R&D experience. The inventory of on-going projects should therefore be continued with an inventory of personnel on post-graduate level involved in R&D or with past R&D experiences and in jobs eventually depending on I&D services in S&T.

Again, The Unesco guidelines for description of personnel can be used and a file can be generated, eventually to be handled by microcomputer.

VI. 1.3 Catalogue of R&D reports in S&T produced in Ethiopia

Work that has been funded locally or as international projects based in Ethiopia should have a large likelihood of being pertinent to local information needs. At present, many reports are produced only in few typed copies and filed in ministries or institutional archives. A copy of R&D reports in S&T should be deposited at the ESTC documentation centre, ESTIC. A bibliographic file can then be produced in a standardized way, using an appropriate indexing system. This file could likewise be processed by microcomputer and various outputs produced, like bulletins and cumulations with subject/title/author/institution indexes etc. Most of the reports on R&D proper are in English, but an increasing quantity of material may in the future be produced in Amharic for extension classes and popularization to the general public. The project on Amharic character processing by microcomputer (see below) may be interesting in this context.

VI. 1.4 Amharic character/text processing

During the seminar a feasibility study for Amharic character processing by computer and printout by matrix printer was presented. It would seem that the technical problems of character representation, processing and printing have been solved in a general way in the context of Japanese text processing (22) and that Japanese equipment (and also e.g. IBM and Wang systems) could easily be adopted to the present task. There would, however, remain a number of specific problems to be solved by experts on Amharic language. It is suggested that a working party be set up to study these problems and to come up with suggestions for decisions necessary to proceed to the technical applications.

Such a project would make it possible to handle bibliographic information on literature produced in Amharic and to produce catalogue cards and printed catalogues, inter alia the national bibliography. It seems possible to handle such operations by micro-computer supported by a 16x18 matrix printer or a small laser printer.

VI. 2 Activities with international exchange

VI. 2.1 Contact network in tropical zone. Many countries in the tropical zone have common interests in a number of areas of applied research which to a large extent are not included in the international bibliographic databases. This gives rise to special needs for joint efforts to improve information on - and dissemination of - results and to coordinate R&D efforts. Publication of results if often "grey" without systematic distribution and retrievability through the secondary literature, and even the local R&D journals have limited distribution outside the country of origin and production is often irregular. It is therefore important to build up a network of communication and exchange with S&T research councils, research organizations and information centres in countries concerned - in Africa, Asia and South America. Project reports should be collected in high-priority areas for local R&D and applications. Further, a database should be built up with appropriate indexing which could be used, inter alia, for production of newsletters containing important references and abstracts. This can also be done by microcomputer. The network should of course also include research institutes in industrialized countries dealing particularly with problems of the tropical zone, and information providing international and national organizations, like UNIDO, GATE, IDRC, etc. An effective starting point for the network would be the UNESCO inventory of information sources and services.

VI. 2.2. Referral service for Ethiopian R&D community. Having established the inventories of on-going research and research personnel in Ethiopia, and the international contact network in tropical zone countries it is natural for ESTIC to provide referral service for the Ethiopian R&D community. This will

enable researchers to get in touch with similar ongoing projects in other countries for exchange of results and experiences. This is particularly important in a situation where formal information dissemination is ineffective and resources for travel to conferences and research visits are scarce.

The information resources of the AAU Library collections should be utilized as back up for this service.

VI. 3 Bilateral projects for computerized informations retrieval and document back-up

ESTIC could play a key role in introducing and running a service which gives access to the international literature not locally available. The basic idea is, following the inventory of on-going R&D projects, to define a "profile of research interest" for each project. These "profiles" are sent to an established service for retrospective and current awareness services. The output (lists of references matching the profiles) are regularly sent to ESTIC for further dissemination to each project group, where requests for photocopies are selected. These requests can be passed on (e.g. by telex from ESTIC) and photocopies sent back by air mail. The resulting service actually simulates the working conditions provided by a large library, with a delay which in most cases is insignificant. It is here suggested that the search services should be run by the Royal Institute of Technology Library, Sweden (KTHB) and the National Library of Technology, Denmark (DTB), and that the back-up should be provided by a joint effort of KTHB and DTB with supplementary use of BLLD. The document delivery services should respond to any request of published material in S&T, whether derived from citations in the literature or from computer-bases bibliographic search. The response rate is about 98% of all requests, i.e. only 2% remain as non-satisfied (undelivered).

ESTIC will have to market this service in seminars and by personal visits to research groups. It has to participate in setting up and subsequently modify profiles in cooperations with research groups to improve the relevance of outputs. It also has to distribute the printouts and to channel the requests for document delivery.

It is suggested that this project is funded by SAREC within the co-operation with ESTC and possibly with contributions from the Danish UNESCO Commission.

A similar service has been working for the area of medicine and life sciences by co-operations between the Medical Faculty Library in AAU and KIBIC (the library and information centre at Karolinska Institutet) in Stockholm. For the agricultural sector, the SDI-service offered by ILCA for searches on CAB abstracts and AGRIS should be marketed and systematically used by R&D project staff. An eventual need of a fuller coverage of CAB abstracts could perhaps be negotiated with ILCA. For document delivery backup of material not available in Ethiopia an arrangement similar to the proposed DTB/KTHB project and the on-going KIBIC project could be negotiated with external funding, assuming that a large library in the field (e.g. in Sweden, Denmark or the Netherlands) is willing to cooperate.

VII. STRENGTHENING THE S&T INFORMATION PROVISION IN ETHIOPIA (Part 2)

Further proposals, with emphasis on the Addis Ababa University Library.

VII. 1 Union Catalogue of R&D journals in Ethiopia. At present there exists no union list of R&D journals available in Ethiopian research libraries or similar institutions. The AAU Library produces a list of current journals arranged by AAU departments (ref 14). Furthermore each of the branch libraries has card catalogues, only covering own collections, and produced by the main library.

As local collections of journals are a substantial component of the document supply system, which has to be established as part of an effective I&D system in the future, it is very important that 1) all R&D journals available for use by the R&D community are registered 2) not only current journals are listed, but reasonably complete account is given of the actual local collections of journals including

missing volumes and issues, 3) such a union catalogue can be currently updated, 4) the production can be made in a cost-effective way and that 5) the file can be printed out and widely distributed.

It is, therefore, proposed that a microcomputer-based union catalogue of R&D journals is set up with the above specifications and handled by the AAU Main Library. This catalogue should cover Natural Sciences and Technology, possibly also Medicine and Agriculture. ESTIC could have a co-ordinating function for assembling the input from libraries other than the AAU library system.

VII. 2 Measures towards widened use of R&D literature.

The admission policies of the AAU Library has been a matter of concern. It was mentioned earlier that, although a major part of the acquisition budget is used for research level literature (journals and monographs etc) the largest part of library visitors are undergraduates, using almost exclusively textbooks, apart from supplementary reading on occasion. The collection of research literature is therefore greatly underused. Yet, external users (other libraries, research institutes, ministry departments, parastatal institutions etc) are discouraged by various administrative arrangements as a result of internal priority dispositions. It is emphatically recommended that, for the investment to be justified, the research collection should be made available to all users who by training and work experience are in a position profitably to make use of this literature. The staff input to cater for a thus widened community is negligible compared to the massive service required for the undergraduate level. Micro-computer supported cataloguing (see section VII. 6) can contribute considerably to a more effective use of the collections, in particular with a system for external ordering of photocopies (with a simple account-system for payment to cover cost of equipment) (see section VII. 4)

VII. 3 Binding and the handling of unbound periodicals

The AAU has its own binding workshop which takes care of journals and repairs of books. Some difficulties concerning availability of binding materials have to be expected, and this might be included in a programme for external financial support. However, a simple calculation of the output vs. manpower indicates that the procedures should be made considerably more efficient by transfer to modern binding technology, which does not require any expensive equipment. This should solve the present capacity problem which gives rise to very serious problems of access to the important recent journal issues.

At present there seems to be little coordination between withdrawal of unbound volumes from the stacks for delivery to binding and the actual binding work. Now boxes are stored in the binding shop for more than a year before processing, and unbound back volumes are boxed in the library and practically inaccessible for use for several years.
With a modern technique and a system for process control, the volumes should not be absent from the shelves more than two weeks.

It is firmly suggested that a shift to modern binding technique is made and that the whole process of binding and delivery of unbound material to the workshop are strictly coordinated so that a minimum of absense from the shelves is achieved.

VII. 4 Photocopying. The use of photocopying for journal articles is in most cases limited due to lack of equipment (and to high cost). This has a negative effect on the efficient use of the collections of research literature not only for use by staff located at a distance from the library but also for university staff. Considering the small user community and the low rate of use of the collections,

a radical change of accessibility could be achieved at low cost by supplying photocopies of locally available research journals when requested. One medium-size photocopier could cater for the entire operation visavis the research community. The maintenance of the photocopy equipment may be a problem and has to be investigated.

VII. 5 Collection enhancement . Detailed statistics on the use of books and periodicals is often a better indicator of importance than expert opinion. Libraries should generally base their acquisition policy on use reports, possibly modified to include a selection of indispendable items that would otherwise be eliminated.

At AAU Library there is also a painful number of missing back issues and full volumes, decreasing the value of collections. It is desirable that a programme for external support should include the purchase of frequently requested back volumes either on microfiche or in the original edition. A selection of titles has to be presented by the library on suggestions solicited from departments of AAU.

VII. 6 Cataloguing. Cataloguing is a centralized operation in the AAU Library System, but card production is very labour-intensive which limits the accessibility in the branch libraries. By introducing a microcomputer system for input and processing of records it would be possible

a) to produce any number of cards for the catalogues in the central and branch libraries

b) to accumulate a file of acquisitions which can be the basis for producing acquisition lists with indexes, and cumulated catalogues giving full information also to institutions outside the University.

The programme for Amharic character processing should eventually make it possible also to handle cataloguing of publications and grey literature produced in the official national language.

For production of cumulated catalogues computer-controlled printout on stencils can be effective for special areas (see section VII 7.2). Microfiche production will also have to be considered in the long run. This can easily be produced within the bilateral co-operation programme, by sending magnetic tapes or diskettes for external processing.

VII. 7 Textbook provision. It was observed that the quantitively overwhelming problem of information provision lies on textbooks for undergraduates.

VII 7.1 The lack of textbooks as described earlier is a barrier to efficient studies. A powerful programme for aleviation of this problem seems well justified. It is therefore suggested that within the bilateral project, a significant allowance is made to build up a collection of textbooks that reestablished the principle of "bookstore"-lending for the duration of entire courses and improves the access to regular 2-week loans for special textbooks and to support the "reserve" or "spot-reading" principle, which still may be necessary as a complement. The use of simple micro-computer based circulation systems can speed up the checking-out procedure considerably. In this way the queueing can be reduced and the use of different titles monitored automatically.

VII. 7.2 The AAU textbook production programme now seems to suffer from lack of modern equipment for text-processing and printing. Since this programme is of great economic importance, it seems justified to try microcomputer-based textprocessing (which is an alternative use of microcomputers rather than special textprocessing equipment).

The finalized (corrected and edited) texts can be transferred automatically from the microcomputer to stencils on a printer. Diagrams have to be supplied in the conventional way unless the equipment has a capacity for graphical display and printout. (An alternative is offset printing which, however, requires expensive equipment with further maintenance problems, and also paper of higher quality).

VII. 8 Manpower Education and User Training. Educated librarians and information scientists are highly needed in order to establish effective procedures for collection, registration and dissemination of relevant information for S&T education and research. There is also need to train users in better handling of their own information problems. The needs of education and training have therefore two main aspects:

VII. 8.1 Postgraduate training of library staff. It is strongly recommended that librarians and information specialists in research libraries are given an opportunity for training in various aspects of library and information science including potentials and applications of new technologies. A post-graduate curriculum should contain courses covering the following aspects:

- computerized cataloguing (using a microcomputer system)
- indexing and abstracting
- reference service and user education
- advanced information retrieval
- strategy for user negociations and establishing of SDI-profiles and other aspects of analyzing and defining needs.

VII. 8.2 User training programmes. The research libraries of Ethiopia and the universities seem to have no tradition of formalized user training, neither at an introductory level (students) nor at a more advanced level (information retrieval methods relevant for researchers in various fields).

For more than a decade research institutions and libraries in many countries offer user education at different levels as a means to integrate a research library in higher education and research. User training should include both traditional bibliographic instruction and technologically more advanced training (online information retrieval). In some countries very comprehensive courses are offered to students, post-graduate students and to university faculty as well.

It is obvious that an educational activity in such a scale is ressource demanding. In Ethiopia, where postgraduate education of the research library staff is very much needed and must have the first priority, it should be recommended that establishing of regular user training programmes as a general offer for the whole user community has a lower priority as long as the above mentioned goal has not been reached.

However, an offer of courses to students in their final year as undergraduates and to all postgraduate students and researchers might be the first step into a situation where a wider range of training programmes is possible.

For both aspects, i.e. postgraduate courses in librarianship and user training programmes, it might be worthwhile to request the assistance of an experienced consultant to work in collaboration with local experts in defining precise objectives and in designing course programmes.

VIII. RESPONSIBILITIES FOR COST SHARING AND PROJECT PLANNING AND MANAGEMENT

VIII. 1 Cost estimated for foreign input. The following estimates are very rough and have to be supplemented by detailed investigations of the market and of maintenance and service facilities in Addis Ababa.

a) Computer-based Information Retrieval Service for about 50 projects, including document provision for references requested by project staff and not available in Ethiopia — 15.000 US$/year

b) Textbook provision programme — 25.000 US$/year for five years

Possibly part of this amount could be refunded to SAREC in terms of local currency

c) Microcomputer equipment for different operations at ESTIC and AAU Library	20.000 US$
d) Software packages for various library applications	depending on selection, but approx. 20.000 US$
e) 1 Photocopier for ESTIC and 1 for AAU libraries	12.000 US$
f) Training of staff for library, information and documentation work. Curriculum development and courses, totally 12 weeks of external expert assistance	22.000 US$
g) Project launching consultancy	15.000 US$

VIII. 2 Local counterpart input. It is here assumed that the following expenditures are contributed as local counterpart inputs:

a) Personnel for various programmes at ESTIC and AAU Library.

b) Service and maintenance costs for equipment as far as payable in local currency.

c) Programming of microcomputers for applications not available as existing packages, inter alia the adaptation of programmes to Amharic character processing.

VIII. 3 The roles of ESTC, ESTIC and the AAU Library for programme planning, coordination and management. In previous sections of this report several activities have been proposed to be set up under the responsibility of ESTIC and the AAU Library respectively. However, it is obvious that some of the projects involve both institutions as well as the University faculties and the Computer Department of AAU. Furthermore a part of the initiatives implies collaboration with institutions and organizations outside Ethiopia.

It has been proposed that ESTIC should coordinate existing and future information services both within the country and in respect to regional and international cooperation. A part of such activities could be the coordination of the suggested inter-institutional projects, such as:

1. Establishment of inventories of on-going R&D projects in S&T and of personnel involved in R&D, catalogue of R&D reports and Amharic character/text processing (section VI) in cooperation with AAU faculties, other research institutions and the AAU Computer Department.

2. Provision of referral service for the R&D community (section VI.2.2) in collaboration with the AAU Library.

3. Bilateral projects for computerized information retrieval and document back-up (section VI.3.) in collaboration with the AAU Library and the two Scandinavian S&T libraries.

4. Development of computer and in particular microcomputer applications for information and library services in collaboration with AAU Library and AAU Computer Department and with the two Scandinavian S&T libraries as consultant resources for system analysis and programme development.

Moreover ESTIC should be the national I&D centre for Ethiopia maintaining international contacts and be responsible for the Ethiopian contribution to strengthen the Pan-African I&D collaboration.

ESTC's functions include formation of policies for development of R&D systems and coordination of research programs as well as the role as national counterpart for programs funded by external sources. ESTC should therefore have the overall responsibility for the execution of the projects including the necessary communication with the Government, policy making and program planning. Furthermore ESTC should act as local funding agency with international and national resource-providing agencies as counterpart.

In order to work out details of planning for the projects and to move into an operational stage for services it is suggested that a Working party consisting of representatives from the local institutions and organizations involved should be set up. A detailed project plan and precise cost estimates for local and foreign input should be worked out as well and discussed with the external counterparts.

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X. VISITS IN ADDIS ABABA

1. Ethiopia Science and Technology Commission
   Haile Lul Tebicke, Commissioner
   Tesfaye Legesse, Chairman, Natural Resources Research Council
   Getaneh Yimene, Project leader, Modern and Traditional Technology
   Gizachew Shiferaw, Chairman, Industry and Technology Research Council
   Berhanu Abegaz, Chairman, Natural Sciences Research Council
   Teferi Kebede, Head, Documentation Unit

2. Institute of Agriculture Research
   Gebremariam Shekour, Deputy General Manager
   Tsegaye Biru, Head, Publications and Public Relations Department

3. Handicrafts and Small-Scale Industries Development Agency (HASIDA)
   Kebede Shiferaw, Head, Project and Research Department

4. Addis Ababa University Library System
   a) Main (Kennedy) Library
      Getachew Biru, Head
      Jitateku Negga, Acquisition Librarian
   b) Central Medical Library
      Tadesse Kelbessa, Head
   c) Technical Library
      Girma Makonnen, Head
   d) Natural Science Library
      Adane Kidanemariam, Deputy Head

5. Addis Ababa University, Department of Chemistry
   Berhanu Abegaz, Professor (see ESTC)

6. International Livestock Centre of Africa
   Michael Hailum, Head, Documentation Centre

7. Armauer Hansen Research Institute (AHRI)
   Dr. Johansen

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